Lab

$$C = \frac{-70.2g\left(4180\frac{J}{kg\cdot C}\right)(26C - 99C)}{62.93g(26C - 20C)}$$

$$C = 550\frac{J}{kg\,C}$$

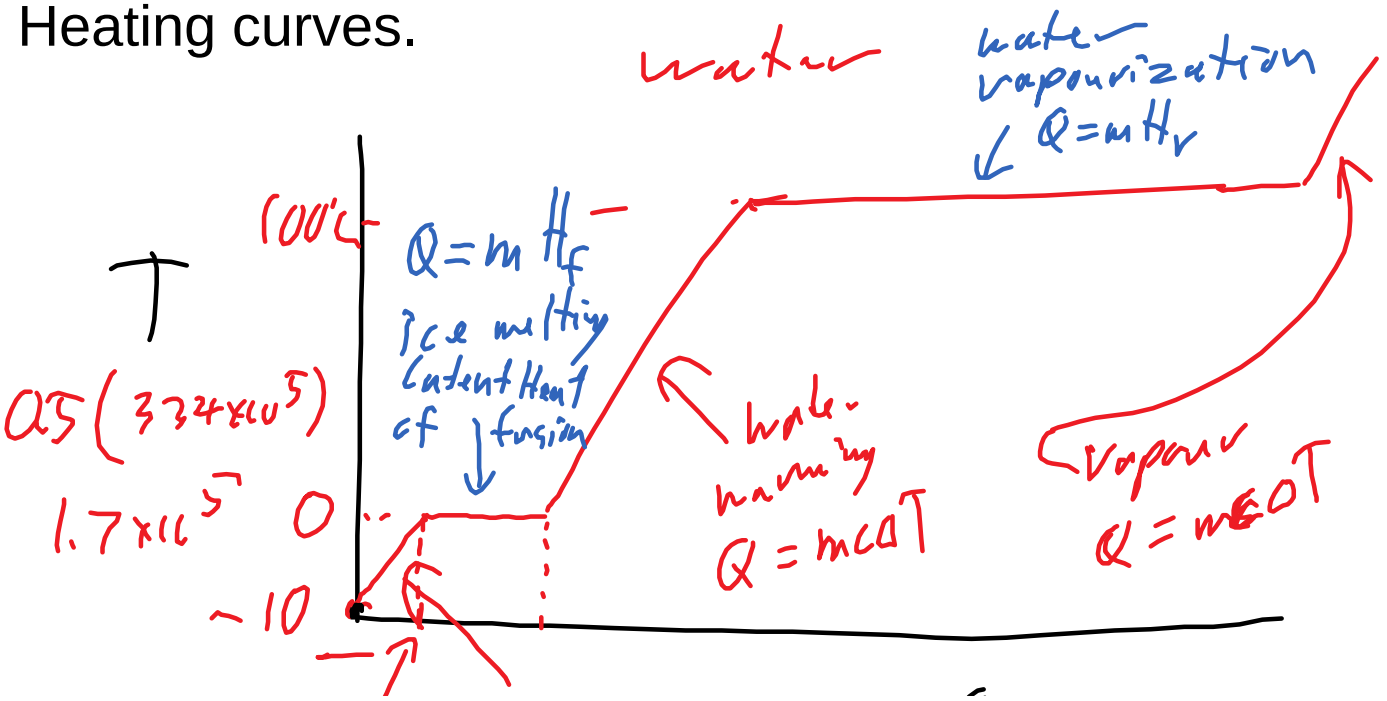
$$\%\ error = \frac{550-450}{450} \times 100\%$$

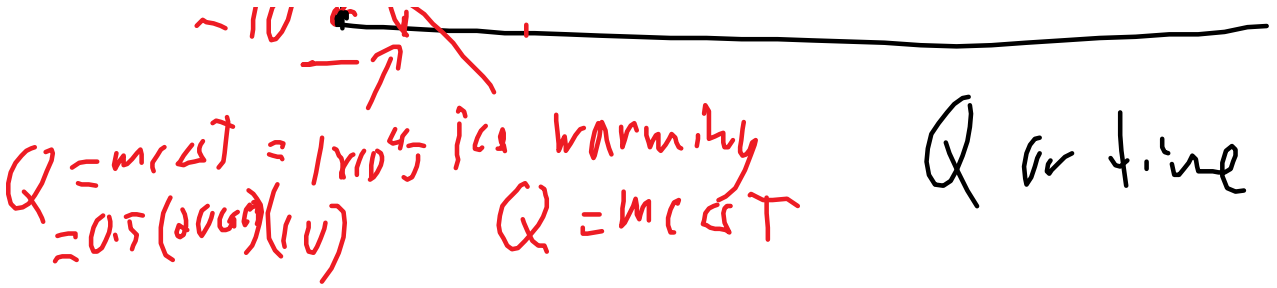
$$\simeq 20\% \qquad \pm 1C \text{ in } 6C$$

Latent Heat

What happened when you heated the water?

Heating curves.





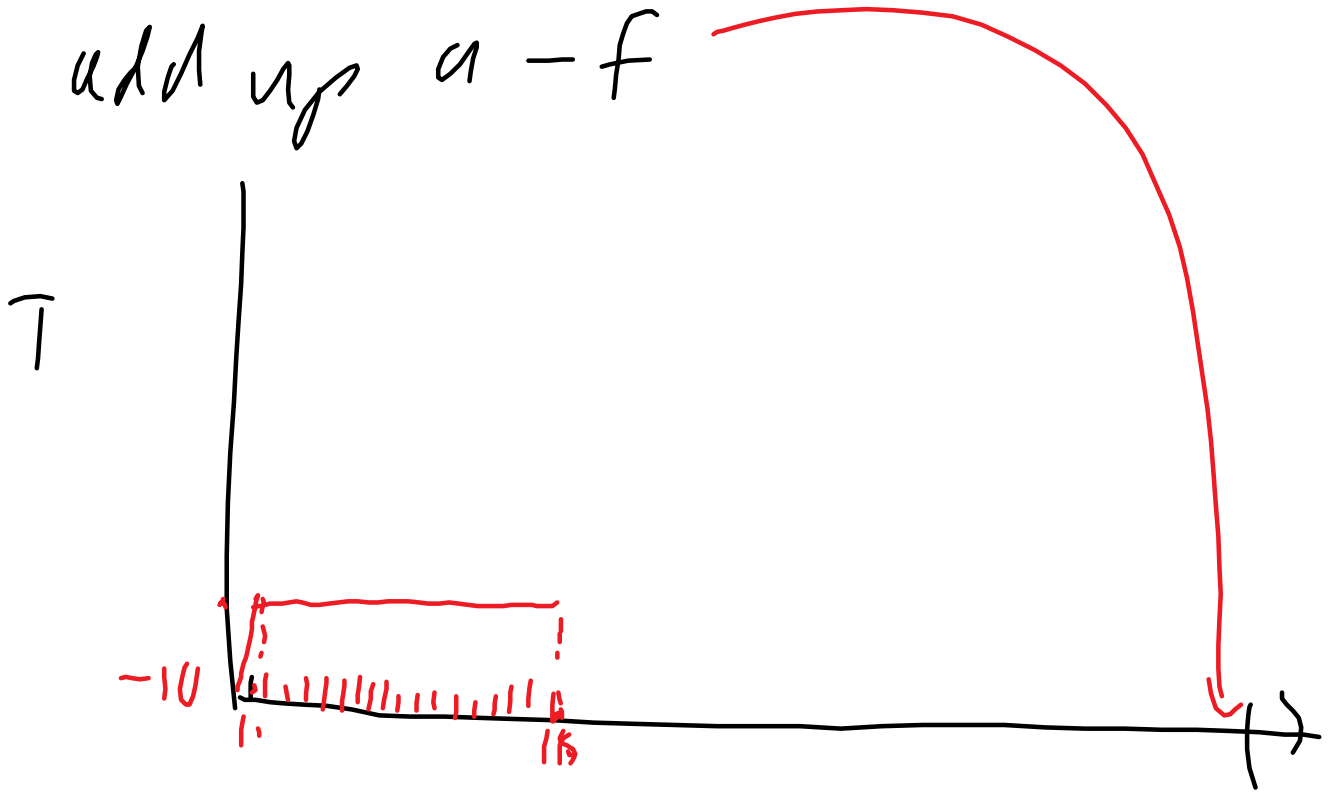
In our model of thermal energy of particles, the average kinetic energy of the particles increases (temperature increases) until the material changes state (solid to liquid or liquid to gas) and the potential energy of the particles increases.

The amount of increase in potential energy is called the latent heat of fusion or vapourization, H_f or H_v. (table in textbook p254)
eg water $H_f = 3.34 \times 10^5$J/kg $H_v = 2.26 \times 10^6$J/kg(wow big!)

eg. You have 500g of ice at -10.0ºC. Determine the energy required to

a) warm it to 0.0ºC
b) melt the ice
c) warm the melted ice from 0.0ºC to 100.0ºC
d) vapourize the water
e) heat the vapour from 100.0ºC to 110ºC
f) graph your results on a T vs Q graph to scale hand in with the lab (hint - get total energy first before you start graphing)

c_{ice}= 2060J/kgºC c_{water} = 4180J/kgºC
c_{steam}=2020J/kgºC
p255 q13-16



Thermal Lab

$$c = \frac{45.24\,g\left(4180\,\frac{J}{kg\cdot C}\right)(21-15)}{63.23\,g\,(21-99)}$$

$$C = 230\ J/kg\cdot C$$

$$\%\ error = \frac{Ex - theo}{theo} \times 100\%$$

$$= \frac{230 - 395}{\quad}$$

$= \frac{\quad}{395} \times 100\% = 4\%$

$0.011_{g}3_{g}(H_f) + 0.0113(4180)(5.5-0) = 0.0804$

4180

$(5.5-14)$

Lab

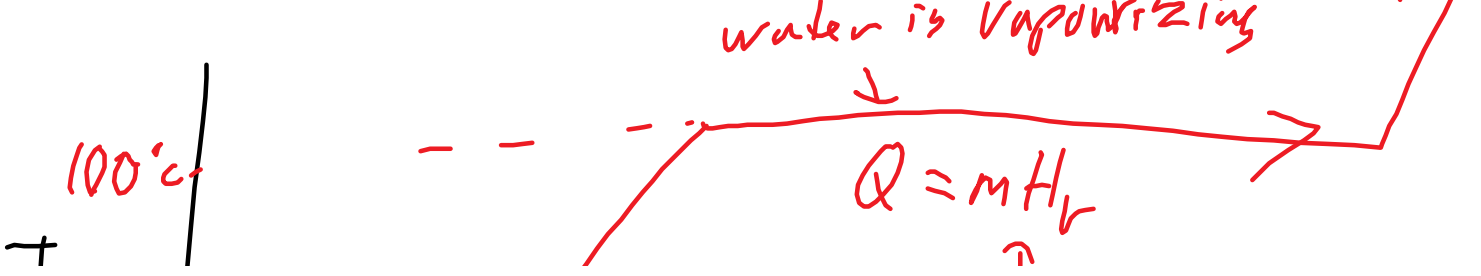
- objective -
- Hypothesis -
- Procedure -
- Data table - units
- calculations
- conclusion
- Sources of uncertainty/error

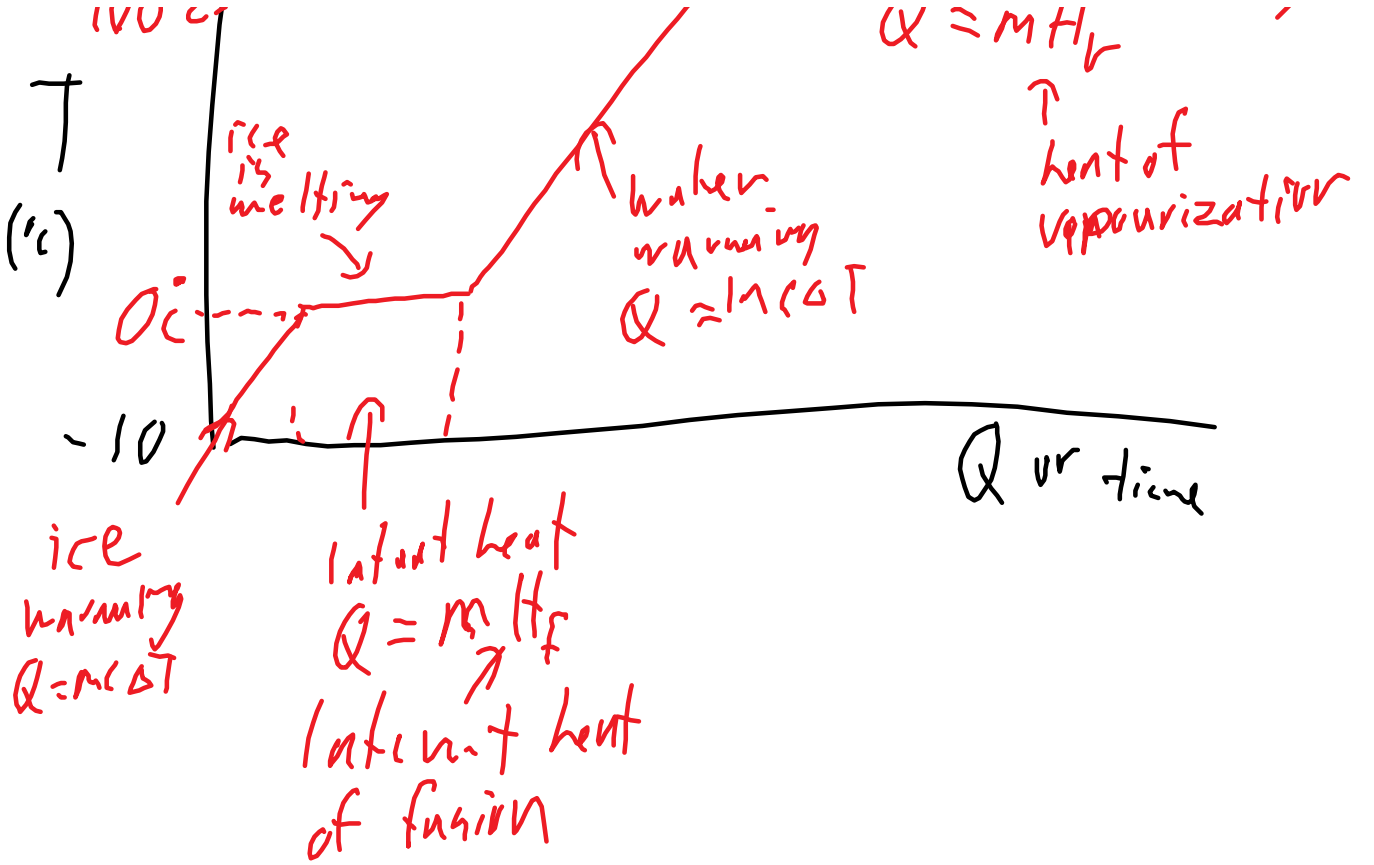
Latent Heat

Look at the Heating Curve of Water

$Q = mc\Delta T$ Steam heating

If you have a beaker of ice on a hotplate:




T
(°C)
0°C
-10
ice is melting
water warming
Q = mcΔT
Q = mH_v
heat of vaporization
Q vs time
ice warming
Q = mcΔT
latent heat
Q = mH_f
latent heat of fusion